

Brooks's Continental Series.



No. 1.

The Physical Configuration  
OF  
The Australian Continent.

With Illustrative Maps and Diagrams.

BY

ERNEST FAVENC.

*R. S. Moore*

WILLIAM BROOKS & Co. LTD., SYDNEY AND BRISBANE.

1905.







**Comprehensive View, in relief, of the  
Continent of Australia.**

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TO  
JOHN FORREST,  
THE EXPLORER,

Who, in 1874, was the first to cross the wide belt of country in the Centre of Australia that separated the settlements of the west from those of the east, this book, on the Physical Contour of our Continent, is dedicated by the

AUTHOR.

Sydney, 1905.

1361463





## PREFACE.

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The following work is a plain and simple description of the surface of our continent, and will, it is hoped, prove acceptable to all Australians—both old and young—who are desirous of becoming better acquainted with the natural features of their great country, their home. For this reason, both in text and maps, all political boundaries, cities, towns, &c., have been largely ignored. The contents are adapted for the use of every State. The publishers trust that this book will further find favour as the first of a Continental Series which it is hoped will tend to foster and encourage the steady growth of a National Australian feeling.

THE PUBLISHERS.



## INTRODUCTION.

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It may sound paradoxical to say so, but forty or fifty years ago, the average Australian knew more about the then settled portions of his continent than he does at present, when so much more is settled and the facilities for interchange of communication are enormously greater. But men travelled then, and the nature of their surroundings was such, that they were compelled to notice and remember the country through which they passed, or in which they resided. They travel now, travel much more in fact, but it is from city to city, from town to town, from one populous centre to another, whirled along without any necessity to closely inspect the country they are passing over.

And a further paradox; many men travel less than before, although the means of transit are now so varied and abundant; but then the rambling, roving spirit is dying out with the growth of generations. Men now become rooted in their homes, the country districts in which they have grown up, and the towns they have watched rise, and helped to develop. To counteract this, the wide teaching of Australian topography, the simple knowledge of the surface and contour of our continent, is at last within our grasp, thanks to the spread of settlement and survey. Our knowledge is still lacking much in detail, but, taking the continent right through, we are now for the first time in possession of sufficient facts to build up a base for a future edifice. This is due to the work of the different survey departments all over Australia, and the extension of their fields of operations. In this, the survey department of Western Australia has done yeoman's service. A vast untrodden field lay before it, but in spite of many difficulties that beset it in various shapes and forms, the work done, during the past ten years, has been heroic, and the unmapped areas of the far west are

now comparatively few in number. Nor have South Australia and Queensland been behind in the peaceful rivalry, and though the States of New South Wales and Victoria have no new lands under their sway, the constant work of improving and perfecting topographical knowledge has gone steadily on.

From the fruits of such labour, the material for this book has been collated. There is no pretence at science in its pages, it simply claims to be an honest presentment of the surface characteristics of Australia, and perhaps, to draw attention to some little-known facts, the knowledge of which may help to dissipate a few fondly-cherished errors of long standing. In dealing with such a far-reaching description, embracing much that is yet but partially known, a few obscure points still open to dispute, are unavoidably met with, but though there may be passages which may excite surprise, or even doubt, no statement has been advanced without good authority.

The feature of this work on which the writer feels—he hopes justly—proud, is the maps. The two relief maps, the map of the river systems and the contour map of the mountain ranges, these have all been specially compiled from approved data, and are original, and novel, in their way. For the relief maps the public has to thank the artistic skill and ingenuity of D. H. Souter, and the accumulation of topographical knowledge of H. E. C. Robinson, the well-known cartographer. For a wise and judicious revise of the subject matter, I must thank James Conway, Headmaster of Cleveland Street Superior School, Sydney.

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# The Physical Configuration of the Australian Continent.

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The physical contour of Australia, as compared with that of the other great continents of the world, displays a formation which may be said to be peculiarly its own. Although its configuration, during past geological periods, differed greatly from its present one, still, its external contour of to-day has remained unaltered for so long that it may well be called the "oldest persistent continent." Many circumstances have contributed towards this—its complete insulation, its situation on the earth's crust, out of line of the track of earthquakes and outbursts of volcanic disturbances, and, finally, the low height of its general elevation.

**Position.**—On the map of the world, Australia is in the south-east portion of the eastern hemisphere. It is south-west of the Pacific Ocean, and east of the Indian Ocean, between the parallels of 10deg. 39min. and 39deg. 11½min. south latitude, and the meridians of 113deg. 5min. and 153deg. 16min. east longitude. The tropic of Capricorn divides it into two unequal portions, the larger of the two being the southern one. Australia is the only one of the continents the entire area of which lies wholly south of the equator. It is thus distinctively *the* southern continent, an appellation which was conferred on it when its existence was only conjectural.

**Contour.**—Although Australia exhibits a great solidity of shape, its coastline is relatively considerable. It has a coastline of 9000 miles in length, which, compared to its continental area of 3,014,050 square miles, is at the rate of 333 square miles of area to every mile of coastline. Its coastline, therefore—comparatively to

its superficial dimensions—is two and a-half times greater than that exhibited by the African continent.

**Relief.**—The highlands of the Australian continent partake of the general characteristic of the highlands of the other continents, where they are found in more or less close proximity to the ocean, and present their steep acclivities towards its waters. So, too, the highlands of Australia, although of comparatively low altitudes, lie near its shores, presenting short and rapid declivities towards the adjoining ocean (or sea) and long slopes towards the interior.

The average height of the Australian continent is 805 feet; not so very much lower than the average height of Europe, which is 939 feet, but it is a mere dwarf compared to Asia, which averages 3189 feet.

The slope of the land in Australia is singular, inasmuch as while still resembling the other continents in the general arrangement of its land-masses, in their coastal neighbourhood and direction of the short slopes seaward, its insularity is marked by these land-masses facing the four points of the compass with their abrupt slopes.

The highlands of Australia, on the east coast, confront the Pacific Ocean with their counter slope, having their longer slope to the west. On the west coast, on the contrary, the highlands present their short slope to the Indian Ocean, and their gradual slope inclines inland. But there is this marked difference. The long slope from east to west is suited to the formation of lengthened river-courses. On the Indian Ocean slope no corresponding long slope from west to east exists. On the contrary, the western half of the interior plateau rises, erratically and almost imperceptibly, but still gradually towards the centre of the continent, and affords no facilities for the formation of water-courses.

The culminating point of the highlands of the east is 7328 feet above sea level. In the west it only reaches



3800 feet. In the north the long slope inclines southward, and in the eastern portion it differs from the western in favouring the formation of long river-courses; the counter slope is presented towards the Timor and Arafura Seas. In the south there is an obvious absence of pronounced land-masses and river-courses; but in the eastern portion a continuation of the lofty eastern highlands boldly faces the Southern Ocean.

**Plateaux.**—The great plateau of the interior of the continent is thus guarded and enclosed by a continuous line of ranges, ridges, and gentle slopes, at times presenting a formidable barrier, and at times an almost invisible rise, but always forming an unbroken water-parting between the drainage of the short, abrupt slope and that of the long.

A description of the Thibetan plateau, written by the late Professor Hughes, might well be applied to Australia, only altering the word "southward" to "eastward." "The traveller who scales them (the highlands) from the eastward finds, when the crest of the mountain-wall is passed, that he is upon an immense plain. The irregular and peak-crowned rampart through which he has ascended forms the barrier of this vast and elevated region: its highest points rise considerably above the general level of the tableland, and, seen from below, appear to form the connecting links of a continuous mountain-chain. But, viewed as a part of the whole continuous mass of high land, they sink into unimportance as compared with its more solid extent and vastly greater proportions."

Making due allowance for difference in altitude, the above might have been written of the great inland plateau of Australia.

This interior plateau is bisected by a defined watershed, continuous in character, but neither prominent nor elevated, nevertheless a true watershed which can be traced north from the head of Spencer Gulf to the edge

of the plateau immediately south of Daly Waters telegraph station on the Overland Line. The eastern section is much more depressed than the western one, but, on the other hand it has the natural features boldly defined and the river channels follow the orderly drainage systems of other continental lands. It is in this section that the most extensive plain of the interior is to be found, namely, the Murray Plain.

A man could start from Port Augusta, at the head of Spencer Gulf, and travel on foot to the Gulf of Carpentaria, without crossing an altitude of one thousand feet. He could cross into the Lake Eyre basin, and, following up the Georgina, arrive at the township of Camooweal, situated at its head. He would there be at an altitude of 713 feet, and within a few miles of the edge of the plateau. The edge of the plateau would perhaps be a few feet higher. Then he would descend the O'Shanassy to the Gregory, and follow that river to the Gulf.

In the southern and western portion of this section of the plateau the slope of the land converges towards an area of depression, the lowest point of which is Lake Eyre, the southern shore of which lake is 39 feet below sea level; but the phenomena of Lake Eyre and its surroundings are dealt with in their proper place.

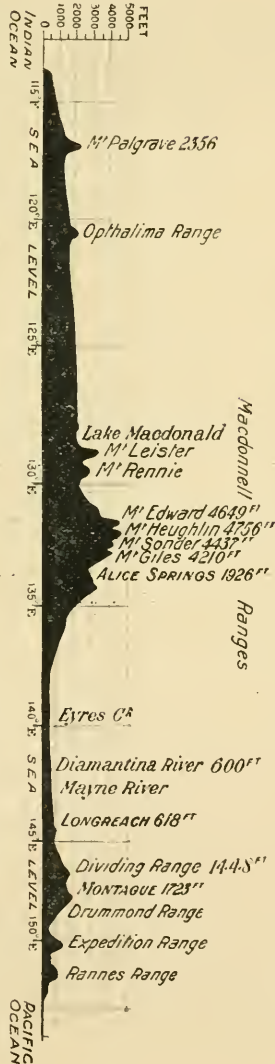
The western section of the plateau is directly opposed to the eastern. It is not so deeply depressed, and its natural features are vague and disappointing, particularly its drainage system, which is without order or method. The surface ascends slightly, conversely to the eastern section, rising very gradually from west to east, and finding its culminating point in the abrupt and sudden rise of the M'Donnell Ranges. The salt lakes of this section are over a thousand feet above sea level, while those in the eastern section are less than 300. The edge of this section of the plateau is highest on its northern face and lowest on its southern.

An imaginary trip across central Australia gives a good idea of the general contour of the continent.

Starting from the coast at the mouth of an important river we ascend a steep range to a plateau, and find ourselves still on the tributary waters of the river we have left. Crossing the basin, another range is ascended, but we are once more on coastal waters, running into the Pacific.

This, in itself, is a strange formation, one coastal plateau overlapping another plateau, and diverting the drainage. When the third ascent is made, we are at last upon the main inland plateau at about a level of 1400 feet. A steady descent is then made until the level is but 350 feet. Shortly afterwards the surface commences to rise towards the M'Donnell Ranges (the nominal centre of Australia), averaging 3000 feet above sea-level, with culminating peaks over 4000 feet.

Descending to about 1700 feet, there is a constant but gradual decline of some 500 miles long to the edge of the plateau, which edge is here a descent of a few hundred feet only. The rivers there continue constant, long and



Section across Australia along the tropic of Capricorn.

even courses to their home in the Indian Ocean, flanked by ranges having occasional altitudes of over 3000 feet.

**Plains.**—The coastal plain which surrounds the continent, and on which the edge of the interior plateau abuts, varies greatly in breadth. Its greatest average width is on the northern coast; the eastern and western plains are of about the same average width; and on the south it is for a long space indeterminable.

But the coastal plain that encircles Australia is worthy of a more detailed description, seeing that it is of such extent, and that through it run the rivers that empty direct into the sea. Its altitude varies considerably, and it is traversed by numerous ranges. On the east side of the Murray it may be said to commence, branching eastward from the great Murray Plain which runs inland. Soon the upstarting Grampians confine it within the commencement of two stern boundary lines. On one side the ocean and on the other the continuous barrier of the Great Divide. Here the plain is watered by many rivers, and preserves a fair average width until it approaches the east coast where it narrows down to a mere strip and starts its northern career on a very narrow basis. Gradually it widens out until the fertile valley of the Hunter affords it a more extended latitudinal space. North of the Hunter it shrinks again and runs an even course until the Macpherson Range, starting from the Great Divide, cuts across it to the ocean. The plain is now narrow, but soon the Great Divide, receding from its proximity to the coast, affords it more space which the Burnett River at once takes advantage of. The coastal plain is here divided longitudinally by chains of ranges, which start from the Great Divide and continue independent careers to the peninsula of Cape York. East of the chains of coast ranges is the low-lying plain adjoining the ocean. Westward are plateaux, which are bounded to the westward by the rise of the Great Divide, which is here far removed from the Pacific. The main tributaries of the Fitzroy drain the most southern of these plateaux, and, united,

descend through a gorge in this longitudinal coast chain, and flow through low country to the ocean. Above this, there is another plateau drained in a similar way, by the Burdekin, only the gorge through which that river descends to the lower plain is very contracted. Following the tropic from east to west no less than three river basins are met with before crossing the Great Divide. First the lower basin of the Fitzroy (Q.), then ascending a steep range (the Boomer Mountains), we find ourselves on a plateau through which flows the Mackenzie, running a southern and western course. Crossing this river we ascend another range (the Drummond Range), and are on the Belyando, running north to join the Burdekin. Still following the tropic and crossing the Belyando, a third range is met with, the Great Divide, the edge of the inland plateau, and ascending it, we are on Thomson waters and in the basin of Lake Eyre.

After crossing the Burdekin the coastal plain is crushed once more into a narrow strip, only asserting its right to some room at the Herbert, and further north at the Normanby.

The plain, where it is drained by the sluggish waters of the Great Gulf, is of considerable extent. The ranges hug the Pacific, and leave the Carpentarian shore an ample margin, and the broad region of Arnhem Land, its eastern horn, would be wholly in possession of the plain, but that it is very broken by plateaux and chains of hills. West of the Victoria River the coastal plain is much traversed by ranges, one of which, the King Leopold, forms a semicircular barrier round a portion of the plain, and here, the gorge formation once more asserts itself at the head of the Fitzroy (W.A.). The plain narrows once more west of the Fitzroy, and for more than a hundred miles is untraversed by rivers. At the Oakover River the characteristics of an extended coastal plain, nourishing rivers and creeks springing from the edge of the inland plateau, and watering a level land dotted with short ranges and isolated

peaks, is resumed once more. On its southward way the plain grows narrower, and when it turns east, its width is greatly reduced, in fact round the Great Bight, the difference between it and the inland plateau is almost undefined; nor are there any rivers in this part of it. Approaching Spencer Gulf it is wider, but still riverless. It is narrow on the east side of the Gulf of St. Vincent, and gradually merges into the Murray Plain once more.

The Murray Plain is the most extensive of the interior; its altitude is under 500 feet; then come the Lake Eyre Plain and the Bulloo Plain.

Both botanically and zoologically there is a marked difference between the coastal plain and the inland plains and plateau.

**Ranges.**—The ranges of Australia have always been a puzzle to the geographer, and it is only now that a true knowledge and estimate of them can be made.

The principal range of Australia is the Great Dividing Range, the study of which may be appropriately commenced at the abrupt southern end, in about 142deg. east longitude, and which then runs parallel with the south coast to the east coast, where it turns northerly. The Great Dividing Range was so called in the early days, when the pioneers found that it formed a prolonged divide between the waters of the coast and the waters which ran to the then unknown west. The name was singularly appropriate, and was retained as the exploration of the eastern portion continued north. In or about the 27th parallel south latitude however, the Great Dividing Range, or the short slope of the inland plateau, recedes from the immediate neighbourhood of the ocean and pursues a more westerly course. As at this point its appearance and height are not striking, and the coastal tiers of ranges between it and the shore—the upheaved edges of subordinate plateaux—are more imposing in appearance, a geographical mistake which has lasted for some time was fallen into. The coast ranges were taken to be the main dividing range.



and under this stolen title they were charted, the name continuing up the Cape York peninsula. In modern geographies even, it is still stated that "these elevations on the eastern side of Australia form a continuous, though most irregular, cordillera or chain of heights, extending from *Cape Howe to Cape York, and known by the general name of the Great Dividing Range,*" oblivious of the fact that the coastal ranges at the base of the Cape York peninsula only form the watershed between the rivers flowing into the Pacific and those flowing into the Gulf of Carpentaria. Reference to the coloured map showing "The River Systems of Australia" will at once make this clear.

The Great Divide, the true edge of the interior plateau, continues its northerly course—screened, as it were, to seaward by the coast ranges—until between the parallels 20deg. and 21deg. south latitude, whence it turns abruptly to the west, and bids farewell to the Pacific slope.

The Great Divide has now its short slope facing north, and maintains during the duration of this face a low altitude and few prominent features. South of the Gulf of Carpentaria is, however, an exception, its character there being that of a rugged, broken range. It assumes its western aspect at about 122deg. east longitude, but in appearance it is still but insignificant, and, as on the eastern coast, is dominated by the superior elevation of the peaks rising from the ranges that intervene betwixt it and the Indian Ocean. At about south latitude 34deg. it turns east, adhering to the coastline that fronts the Southern Ocean, and towards the western termination of the Great Australian Bight, in 124deg. east longitude, it ceases to have any prominent material existence.

The highest points in this chain of between 8 and 9000 miles in length are as follows:—

## SOUTHERN OCEAN SLOPES.\*

**Over 6000 Feet.**

Mount Feathertop	Victoria.
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**Over 5000 Feet.**

Mount Hotham	„
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„ Cepe	„
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„ Bogong	„
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„ Wills	„
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„ Gibbo	„
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The Cobboras.	„
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The Snowy Plateau	„
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The Twins	„
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Mount Baw-Baw	„
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„ Tamboritha	„
--------------	---

„ Wellington	„
--------------	---

„ Buffalo Peak	„
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„ Dargal	„
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„ Kent	„
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„ Cobbler	„
-----------	---

„ Selwyn	„
----------	---

„ Buller	„
----------	---

„ Howitt.	„
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**Over 4000 Feet.**

Mount Pinnabar	„
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„ Baldhead	„
------------	---

„ Towanga	„
-----------	---

„ Benambra	„
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\* The word "slopes" is here used to indicate both the inland and seaward slope.



Mount Tambo	Victoria.
„ Matlock	„
„ Torbreck	„
„ St. Bernard	„
„ Burrows	„
„ Ellery	„
„ Wellington	„
„ Useful	„
Castle Hill	„
Notch Hill	„

PACIFIC OCEAN SLOPES.

**Over 7000 Feet.**

Mount Kosciusko. N.S.W.

**Over 6000 Feet.**

The Pilot	„
Mount Sea-View	„
Ram's Head.	„

**Over 5000 Feet.**

Forest Hill	„
Ben Lomond	„
Mount Tate	„
„ Clarke	„
„ Murragural	„
Chandler's Peak	„
Look-out Point	„

**Over 4000 Feet.**

Mount Lambie	„
„ Clarence	„
„ Marsden	„

Mount Beemarung	N.S.W.
„ Capoombeta	„
Wilson's Peak	„
Beulah Spring	„
Mount Binda	„
„ Cordeaux	„
„ Gourada	„
„ Horrible	„
„ Jindulia	„
„ Talbingo	„
„ Tumanang	„
„ Delegete	Victoria.
„ Tinga Ringa	„

The remaining course of the Great Dividing Range is unmarked, either on the Carpentarian, Arafuran, or Indian Ocean slopes, by any elevation above 4000 feet.

Mount Kosciusko is the highest altitude in Australia. Next to it comes the companion mountain, formerly Mueller's Peak, but now Mount Townsend; and this mountain is supposed to be the one named Kosciusko by Strzelecki. The name having been transposed by the Lands Dept. on finding the new point (now Mount Kosciusko) to be the highest.

The following efforts at determining the height of Mount Kosciusko have been made at various times in the past:—

	Test.	Feet.
Strzelecki ... ..	Boiling water	6,500
Mueller ... ..	Boiling water	7,000
Clarke ... ..	Aneroid ...	7,175
Geodetical Survey of		
Victoria ... ..	Triangulation	7,266
Lendenfeldt ... ..	Aneroid ...	7,171
Wragge ... ..	Aneroid ...	7,525

but these altitudes, except Wragge's, apply to the original Mount Kosciusko, now Mount Townsend.

The height of Kosciusko above the level of the sea is officially given as 7328 feet. Its height above the surface of Lake Eyre, however, is 7367 feet on account of that lake being 39 feet below sea level. Taking the centre of the lake as a level, it is 7388 feet. Mount Kosciusko and Lake Eyre are the highest and lowest points in Australia.

The local names of this mighty Divide are as many and various as its changes of appearance and attributes. It may be said to commence in the Black Range, a range which, though isolated in situation, is still connected with the main range, and forms a convenient starting point for descriptive purposes. On the Southern Ocean slope it bears the names of Hume, Barry and Bowen: on the Pacific slope it commences with the Muniong, wherein the loftiest elevation of the Divide is found, then the Monaro, Gourock, Cullarin, Liverpool, New England, and Bunya-bunya Mountains.

The Great Divide is then without local names, until after it has deflected from the Pacific slope and turned its short front to the north. Then towards the Gulf of Carpentaria, it is known under the names of Kirby, Selwyn, and the Barclay Tableland.

From the Barclay Tableland it skirts that large portion of Australia wherein what may be called the *Evaporation-cum-Soakage System* prevails in the interior, and here it is simply the edge of the great plateau; its only name on its western course is the Great Antrim Plateau. On the Indian Ocean slope, the range, too, is locally nameless; its character, as the abrupt edge of a tableland, not being striking enough to divert attention from the many other ranges which here traverse the coastal plain; and it perpetuates this character up to its ostensible disappearance at the western end of the Great Bight. Then reappears as the Hampton, Gawler, and Flinders Ranges, and again disappears when near the Murray. But although it assumes during

its tedious career every possible character from an inaccessible mountain rampart to a gentle sloping prairie, every altitude from over six thousand feet to the height of a house-top, it always draws an imperative line round Australia between the coastal rivers and the inland drainage; save and except the Murray. That river alone, after gathering in between its banks the spoil of many, many streams from the inner slopes, emerges triumphantly to the Southern Ocean.

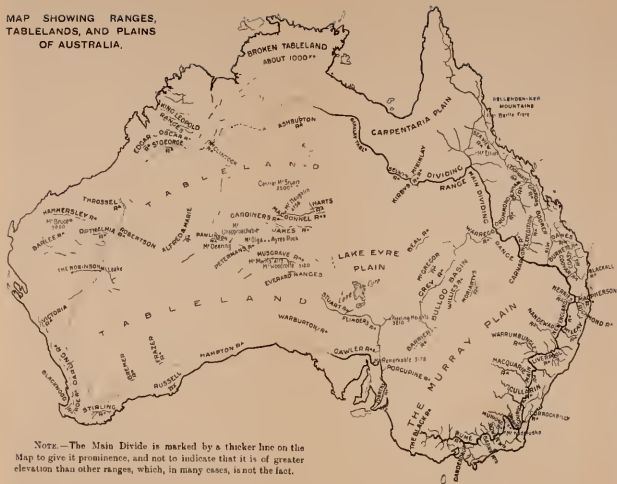
Practically, a man could start from the Black Range, on the left bank of the Murray, travel round the continent and return to the right bank without having crossed stream or river on his long course. Theoretically, he could pursue the same journey without crossing the smallest water channel.

Most of the many ranges on the southern and southern-and-eastern slope are, more or less, connected with the main divide, which here, in its highest and boldest aspect, throws off several prominent spurs, both oceanward and inland. Some of these have peaks in them over four thousand feet. On the inland side is Mount Canoblas, 4610 feet, and on the Macpherson Range, a Pacific spur, there is Mount Lindsay, 5700 feet, and Mount Barney, 4300 feet in height.

In the north there are, however, many ranges and plateaux, which hug the Pacific, and although a connection can be traced to the parent stem, are virtually independent of the Great Divide. Though rugged and imposing in appearance, they are of no great altitude. Two isolated mountains on either side of the Burdekin, are prominent peaks from seaward, Mount Elliot, 4060 feet, and Mount Dalrymple, 4255 feet. On the Cape York Peninsula, there is also one cluster of exceptional height, known as the Bellenden-Ker Group; here there are many peaks which pass the 4000 feet limit: Mount Massie, 4014; Sophia, 4253; Harold, 4150; Bartle Frere, 5438; Centre Peak, 5158; South Peak, 5000. South of Cambridge Gulf some prominent ranges



MAP SHOWING RANGES,  
TABLELANDS, AND PLAINS  
OF AUSTRALIA.



NOTE.—The Main Divide is marked by a thicker line on the Map to give it prominence, and not to indicate that it is of greater elevation than other ranges, which, in many cases, is not the fact.

assert themselves, but though, like the King Leopold Range, their appearance is formidable, their height is under 4000 feet. Facing the Indian Ocean the coast ranges are many and rugged, especially the Hammersly Range, but the highest point, Mount Bruce, is only 3800 feet.

A group of mountain ranges, known under many names, runs north and south, and faces the eastern shore of Spencer Gulf; the highest peak in it, however, is under 4000 feet.

The independent ranges of Central Australia are many and scattered; the great central group is called the M'Donnell Ranges. These are situated in the neighbourhood of the tropic of Capricorn, and consist of a most intricate series of ranges, the leading feature of which seems to be to assume east and west lines, and in this formation they extend nearly 300 miles. They rise in a series of terraces, tier behind tier, until the highest ridge, which is the northern one, culminates in peaks over 4000 feet high. Two of them, Mount Edward, 4649 feet, and Mount Heughlin, 4756 feet, are situated on the most northern tier, and Mount Sonder, 4437 feet, and Mount Giles, 4210 feet, are about midway, overlooking one of the latitudinal valleys that characterise these ranges. The head tributaries of the Finke, the Hugh, and the Todd, rise in a labyrinth of water-courses in these ranges, and flow south, taking a course at right angles to the east and west trend of the valleys. The Finke (or Larapinta) has two main tributaries which have their sources respectively at Mount Sonder and Mount Giles. It then makes its way through another range, the Krichauf Range, to the south, pursuing a remarkably sinuous course in so doing.

The Lake Eyre basin drains nearly all of the long slope of the M'Donnell Ranges, but although the highest points, Mounts Edward and Heughlin, are north of its sphere of drainage, no rivers flow to the westward from this group. Their elevation, the large area they cover

and the extensive break they make in the great inland plateau, render these ranges a most important feature in the contour of Australia.

Another collective group is named the Musgrave Ranges, and contains some peaks approximated at 4000 feet, and one, Mount Woodruffe, estimated at over five. The Peterman and many more isolated ranges are dotted over the great plateau, but none of them high enough to be considered noticeable features in the general contour or to become the sources of rivers.

## THE RIVERS OF AUSTRALIA.

The rivers of Australia are divided into two distinct types, the coastal and the inland. The coastal rivers have their sources in the seaward slope of the Great Dividing Range, or some independent range on the coastal plain, and flow direct into the oceans and seas surrounding Australia. The inland rivers are again subdivided into the Murray River system, the Lake Eyre system, and the Evaporation-cum-Soakage system.

**The Murray River System.**—The Murray and Darling rivers together collect the accumulated drainage of the eastern interior, and then, by way of the Murray, it is discharged into the Southern Ocean. If you glance at any large wall-map of Australia, the Darling has the appearance of being the main stream, it holding a direct south-west course throughout, and being but temporarily deflected by its junction with the Murray, while that river holds a consistent western course and is then turned south by the Darling. The Murray drains that slope of the main Divide which faces north and west, and like its main tributary to the northward, the Murrumbidgee, it has its birth-place in the highest altitudes of those slopes. After leaving the mountains, the Murray has but one tributary on its right bank, the Murrumbidgee, which, however, brings with it in its turn, the lengthy Lachlan. Before the Murrumbidgee actually junctions



with the Murray, it is disorganised by the low, flat country, and throws out arms which join the Murray independently and are mistakenly called rivers. The Murray and Murrumbidgee are the only snow-fed inland rivers. The Lachlan is more of the central Australian type, ditch-like, intermittent and inclined to run out.

The Darling shares the task of mothering the inland streams for transmission to the Southern Ocean. It brings in the Bogan, Macquarie, Castlereagh, Namoi. Macintyre, Condamine and Warrego, and sometimes the Paroo. All these rivers are of the typical formation of the long inland slope, which is evinced in their sluggish courses and occasional multiplicity of channels.



Diagram showing multiplicity of channels of an inland river in level country.

The Darling pursues most of its career through the great Murray plain, which accounts for the ditch-like appearance and flat shallow banks of it and its tributaries. The Darling then, and the lower Murray, receive nearly all the inland drainage of the northern and western slopes of the Main Divide, the exception being the Barcoo, which flows into Cooper Creek, thence into Lake Eyre. The Darling continues its even way through level country, from its true head, the Condamine, to its junction, but its waters are wide-spread when all its many tributaries are in flood at the same time. Between the basin of the Murray and that of Lake Eyre, is a river called the Bulloo, which runs an independent course of its own, belonging to no system and discharging into a shallow swamp, whose waters are lost by evaporation. It skirts the Grey Ranges, a straggling offshoot of the Main Divide, which forms the eastern boundary of Lake Eyre Basin.

**The Lake Eyre System.**—The mystery, for it cannot be called anything else, of the Lake Eyre system of drainage, lies in the final exit of its waters. Lake Eyre is the deepest point of the depression in the south-east of the plateau, of which mention has been made. This lake, which is a sink for the rivers flowing into it, is 3200 square miles in area, and 39 feet below sea level. It is mostly a dry bed, the southern portion alone holding water. Into it flow rivers from the western and southern slopes of the Main Divide which face inland from the Pacific and the Gulf of Carpentaria. These are, the Barcoo and Thomson, united in the Cooper Creek; also the Diamantina, with its long tributaries. From the M'Donnell Ranges come the Field, Arthur, Todd, Finke and others, running long courses and draining large basins. The drainage area of Lake Eyre is enormous; in the north-east its tributary streams head in the neighbourhood of the heads of the Darling, the Fitzroy, the Burdekin and the Flinders; while on the north its tributary waters rise within 170 miles of the Carpentarian shore-line, and it may be said to receive all but



Watershed of Lake Eyre.

an inappreciable portion of the drainage from the extensive group of ranges known as the M'Donnell Ranges; the whole area is roughly calculated at about 417,000 square miles.

In spite of this army of affluents, Lake Eyre is never full nor visibly affected, as a whole. In flood time these rivers, particularly from the north-east, bring down vast quantities of water and submerge the low-lying country but never swell Lake Eyre; and it has no outlet to the ocean. There is no doubt that at least half of the flood-water that drains from the Lake Eyre watershed is accounted for by diffusion, by soakage, and by evaporation; but even so the unaccounted-for disappearance of the remaining half that reaches the lake, is still a mystery. Another singular fact in connection with this lake is that it is the only one out of the many salt lakes of that region that has any extended watershed; the drainage into Lakes Torrens, Gairdner, Frome, and the others, is merely that of poor little local creeks.

#### **The Evaporation-cum-Soakage System.\***

—This system may be said to prevail throughout the western half of the interior of Australia. It extends westward from the watershed of the Lake Eyre Basin, and is bounded by the edge of the interior plateaus. From a topographical point of view, it is a hopelessly unsatisfactory region to deal with, on account of its lack of definite physical features.

The only water channels north of the Lake Eyre watershed, head from the Barclay Tableland and flow westward. They have a continuous and defined course for about 100 miles, and are then lost by diffusion in dry, flooded flats, by evaporation and soakage. They are Buchanan's Creek and Creswell Creek, and both run through excellent pastoral country. Another creek, Ross Creek, forms the well-known Newcastle Waters, named by M'Douall Stuart, which are lost in the shallow depths of Lake Woods. The largest and best de-

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\* Riverless area.

finest watercourse, however, is Sturt's Creek, which heads from the edge of the tableland and runs fairly south for over 200 miles, being finally lost in a small salt lake. Strangely enough, although this was the first watercourse discovered in this huge riverless area by A. C. Gregory in 1856, and has no leading tributaries, none other approaching it in length or continuity exists.

The drainage of this featureless land consists of small, insignificant creeks, which pursue no system but run a broken fragmentary course for ten or fifteen miles at the furthest, and then are lost by one or all of the three causes mentioned—soakage, evaporation or diffusion. Their commencement is unaccountable, their course aimless, and their end desultory; such are the creeks of this system. They never seem to gather together coherently to form a main creek or to have energy enough to cut out a continuous channel; they are just the sport of the earth-strata, the weak elevations, and exceptionally heavy rainfalls. It seemed once that, in the end, a system however feeble and vague, would be evolved out of these unpromising materials, but a closer and more systematic examination of the country has revealed nothing tending to throw any light upon the existence of any orderly system of drainage in this part of Australia. The absence of a sufficient rainfall is the primary cause.

**The Coastal Rivers.**—On the great coastal plain, the rivers attain in their youth sufficient velocity and vigour to enable them to cut out and maintain enduring channels to the sea. Thus their sources and terminations are, as a rule, conventional, and, according to orthodox rules, they rise in a range and flow into the sea; though some have sufficiently distinctive features of their own, to render them noticeable amongst their fellows.

**Pacific System.**—On the Pacific coast there are to be found most of the Australian coastal rivers. The heavier rainfall and the higher elevation favours their creation, just as on the Indian Ocean coast, a lack of these advantages reduces their number. Where the Div-

iding Range is in close proximity to the sea, and is abrupt and steep, the rivers often run parallel with it for some distance, then turn and make for the shore. This is very marked on the southern coast of New South Wales in the Shoalhaven, and the Hawkesbury, both of which rivers skirt the range for some distance, from south to north, before heading seaward.

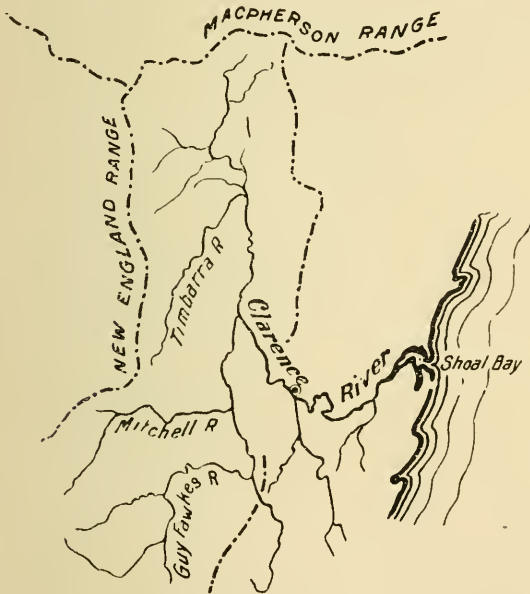
The Hawkesbury is a marvellous river from its long course parallel with the Main Divide, during which career it has various names, and on its right bank receives tributaries, the sources of which are almost within hail of the sea shore.

The Hawkesbury is the oldest historical river of Australia, not on account of being the first discovered, for the Swan (W.A.) was the first to be traced with boats, but the Hawkesbury was found so immediately after the settlement was formed, and was so bound up in the early history of this continent that its name is part and parcel of it.

The Hunter is likewise both historical and remarkable. The valley drained by the Hunter forms a long indent in the margin of the great plateau, and, unlike the Hawkesbury, the ascent therefrom is easy and practicable. It was a noteworthy incident in our history that when the "Lady Nelson" was examining and surveying the river, she had on board, engaged in charting it, three men who had attempted the passage of the Blue Mountains and been forced back—Paterson, Barrailliere and Cayley. If they had but known it at the time that the river they were then surveying would have led them through a smiling valley up an easy ascent to the sought-for land, a chapter of our history would have been forestalled.

Another striking peculiarity of a coastal river, is when it drains a secondary or inferior plateau, between the Great Divide and the coast ranges. These long tributaries coming from north and south, overlap—so to say—the short coast stream, and uniting, form the main river before descending to the plain bordering the ocean.

There are three rivers which are peculiar exemplifications of this—the Clarence, the Fitzroy and the Burdekin. One head of the Clarence rises in the Macpherson Range, on the border of Queensland, and the other heads south of Ben Lomond. The two run towards each other from north and south, meet, unite, and hurry seaward.



Watershed of the Upper Clarence.

The Fitzroy is still more striking, for the Main Divide is there some considerable distance from the coast, and the presence of tiers of high coast ranges cause a plateau of considerable elevation between them and the Divide. The tributaries of the Fitzroy are spread over this plateau; the Dawson in the south, and the Mackenzie and Isaacs in the north, drain it, and, united, form the Fitzroy, which then descends to the coast,



and empties in Keppel Bay. The Burdekin has a very long southern tributary, called the Belyando, which intervenes between the waters of the Isaacs and the Main Divide, and the Burdekin itself comes from the north with considerable drainage. Just below its junction



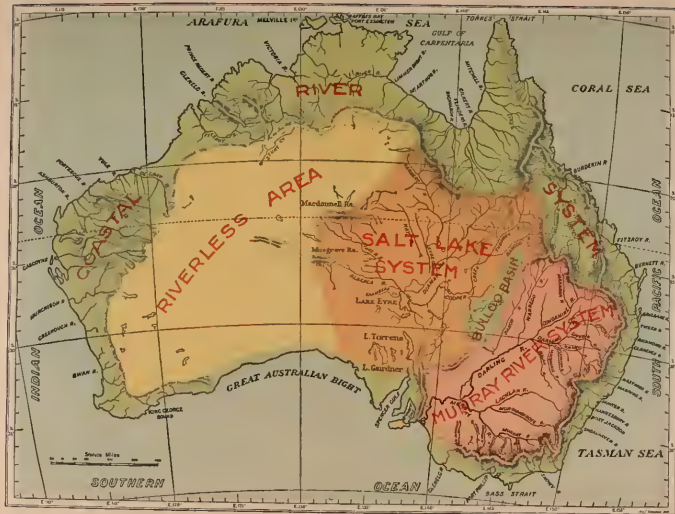
Watershed of the Upper Fitzroy (Q.).

with the Suttor, which brings in the Belyando and Cape Rivers, there is a gorge in the Leichhardt Range impassable to four-footed animals,





The River Sys



The River Systems of Australia.

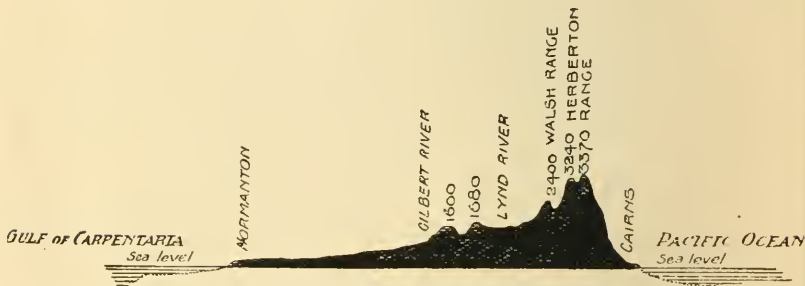
and through this gorge the Upper Burdekin, as it is locally called, descends to the coastal plain and becomes the Lower Burdekin.



Watershed of the Upper Burdekin.

These three rivers occupy as it were, each an elevated plateau of its own, which the highest and most influential tributaries drain before descending to the lowest level contiguous to the ocean. In the case of the Burdekin especially, the Leichhardt Range, which forms the eastern edge of this minor plateau, is a continuous and formidable barrier and through it the river forces its way down through a rocky gorge in short falls and rapids. The Herbert, which drains the opposing watershed to the heads of the Burdekin, and flows into the Pacific, has also, in a great degree, this plateau formation.

The peninsula of Cape York, the most northerly point of Australia, presents a peculiar river system of its own, somewhat resembling that of the main continent in the way that the coast range—which is here of reasonable height—frowningly faces the Pacific with its abrupt slope down which run but short rivers, while the slope to the Gulf of Carpentaria being gradual, the long rivers, such as the Gilbert, Mitchell and others, are on that side, running westward.



Base of Cape York Peninsula.

The Gulf of Carpentaria has many long rivers included amongst the number of those that are lost in its mangrove-fringed waters. A reference to the map of the river systems will show the reason of this in the large extent of its width of coastal plain. The Flinders is a peculiar river, large, and draining a vast amount of country; it takes its rise on the slope of the Great Divide, where the crest is so tame and unmarked that the watershed is nothing more than a swell of the rolling, treeless downs that there form the parting of the waters. Theoretically, the raindrops that trickle down the northern face of a clump of grass, join those that meander to the great Gulf, and those that drop from the southern face find themselves sailing along to an obscure grave in Lake Eyre. Another peculiarity of the Flinders is the fact that the country on its banks appertains to the inland slope more than the coastal in appearance, soil and herbage. The Macarthur, another Gulf River, has also this characteristic. The Roper is a large, navigable river, which flows into the Gulf of Carpentaria.

The district known as Arnhem's Land, which forms the western horn of the Gulf, has no resemblance to the eastern one in contour, excepting a similarity of shoreline. It boasts neither mountains nor ranges, and, consequently, the rivers traversing it have no distinctive attributes. The largest are on the western coast and are named the Daly and the Victoria. The only river of importance that flows into the Timor Sea is the Fitzroy, which, like its eastern namesake, drains a coastal plateau.

The two largest rivers of the Indian Ocean system are the Ashburton and the Gascoyne. The Ashburton is the longest river of this system. It rises at the edge of the great inland plateau in broken, barren country, clothed with spinifex and mulga. Its course for some distance is through a similar forbidding region, and it then emerges—a broad, sandy river—into good pastoral land, cut up into picturesque valleys by sharply peaked sierras. All these valleys are of considerable breadth and contribute large water-courses. The Gascoyne, like its

follow the Ashburton, has its source in the edge of the inland plateau. The upper reaches of the river flow through a large basin of comparatively level country, well grassed. After receiving tributaries from north and south, it runs through a pass between two hills, and pursues an even way to the west coast. The difference between these two typical west coast rivers is very marked. The Gascoyne has much the appearance of an inland-flowing river; its upper channel is variable and intermittent, and the junction-points of the higher tributaries are generally flooded flats, whereon the bed is lost. The Ashburton, on the other hand, resembles one of the coastal rivers of the east; running midst boldly marked ranges, having a broad sandy bed with heavily timbered banks and islands. The Murchison is also an important river of this system, and that short coastal stream the Swan, is noticeable from taking its rise at the back of the Darling range, and penetrating it on its way to the sea.

A comparison of two of the principal rivers of the east and west coasts, with regard to elevation and length, may prove instructive. Only in such a comparison it must be borne in mind that the source of a river is a very indeterminable quantity; the only thing to go by is the general altitude of its highest tributary.

The Burdekin rises in Table Mountain in the Razor-back Range. In a direct line it is 200 miles from its mouth; following the sinuosities of its course it is more than twice as much, namely 425 miles. Table Mountain is about 2500 feet high. Amongst its bends and curves, it thus descends 2500 feet in 425 miles. The Burdekin, however, takes some leaps during its progress. One at its birth, another short leap opposite Charters Towers, and a mighty bound at the Gorge, through which it flows through the Leichhardt Range.

Its longest tributary is the Belyando from the south. This river runs a fairly straight course. It is 250 miles from its source in the Great Divide—2000 feet high—to its junction with the Burdekin at 790 feet. It falls 1210 feet in 250 miles. The Belyando has no falls nor

rapids, but its junction with the Burdekin takes place before the Burdekin takes its last leap. (Properly speaking the Belyando takes the name of the Suttor below the junction of the two rivers; but the Belyando is undoubtedly the main stream.)

The Fitzroy (Q.) has its source in the Main Divide at the same height and in the same neighbourhood as the Belyando. Its length in a straight line is 250 miles, but at least two thirds must be added for curvature. It makes one rapid descent at its birth and another at the Boomer Range; 2000 feet in 410 miles.

On the west coast the longest river is the Ashburton, 380 miles long, in a straight line, to which 200 miles should be added for curvature. It rises in the edge of the main plateau, the estimated height of which just there is about 1500 feet. Its course is fairly even without falls or rapids; nearly 2000 feet in 580 miles.

The Gascoyne comes second in length. Its source is in Mount Leake in the Robinson Range; 2000 feet; and its course direct to the Indian Ocean is some 360 miles. It has no falls nor rapids; 2000 feet in 500 miles. Thus we see that although there is no such great difference in the relative descent of the east and west rivers, the descent on the eastern side is of a more rugged and torrential character. Also, the Burdekin and Fitzroy hold much more sinuous courses than the Ashburton and Gascoyne.

The Southern Ocean System is practically unrepresented in its western portion; and, save for a few small streams that fall into Spencer Gulf, in the central portion also. After crossing the Murray, however, the growing and aspiring highlands assert their presence in the many rivers that now break the shoreline with their mouths. The beautiful Glenelg, the Hopkins, the La Trobe, the Mitchell, and the Tambo; and the giant-born Snowy River rushes impetuously forth before the slope turns its face from the bleak Antarctic.

**Lakes.**—The lakes of Australia are of an unsatisfactory nature. The fresh water ones are small, and the so-



called salt *lakes* are simply huge saline bogs. The fresh water lakes do not include any that are of sufficient importance to form noticeable features in the topography of the continent. The salt water lakes, on the contrary, are, unfortunately, sufficiently impressive to influence a considerable area of the country. The peculiarities of Lake Eyre have been already reviewed, and as has been said, it is the only one that has anything more than local drainage. Lake Torrens, though there is high country in its neighbourhood, has but an insignificant inflow compared to its size, and so with the others spread over this depression in the inland plateau, which is known as the salt-lake region. Lake Torrens has an area of 2250 s.m., and is 111 feet above sea level. Its bed is generally dry, but when it holds water the depth is calculated in inches. Lake Gairdner is 1840 s.m. in area, and 200 feet above sea level. Lake Frome has an area of 930 s.m., and is 200 feet above sea level. There are some minor lakes of small size in the Eyre basin, which are filled by the occasional overflow of Strzelecki Creek, an arm of Cooper Creek. But the evaporation of this region is too great for shallow bodies of water to stand any time without a constant source of supply.

North-west of this region of dry lakes is another lake called Lake Amadeus; it is over 1000 feet above sea level, and about 700 square miles in area. Although situated near the western slope of the M'Donnell Ranges, it receives little or no drainage worth speaking of from this group, on account of its near proximity to the crest of the water-shed of Lake Eyre. North-west of Lake Amadeus is Lake Macdonald, another shallow lake of the same type which, on its western side merges into a swamp. It is of a more solid shape than that lake, but about the same area and height above sea level. For some time it was considered as part of Lake Amadeus, which led to an erroneous idea being entertained as regarded the size of that lake; it is, however, in no



way connected with it. All over the western interior plateau are to be found these saline bogs, which seem to fill no useful purpose in nature's economy, nor is their presence an actual necessity as a receptacle for the overflow of creeks and rivers, as is Lake Eyre. Their saltness is entirely due to the saline nature of the soil where they are situated. In fact, in places the pools of rain become salt after lying on the ground some few hours.

As this description of country is where the Australian desert is making its last desperate stand, it may not be out of place to give some account of that ancient bugbear and its gradual evanishment.

Fifty or sixty years ago the whole of the vast interior of Australia was labelled, both on maps and in books, as a desert—usually “a sandy desert.” Year after year the borders of this desert were encroached on and invaded by the pioneers, and as it was closed with its terrors disappeared; at the present moment the desert that once was supposed to dominate inland Australia is now confined to that portion of the western plateau between the 121st and the 129th meridians of longitude, and the 19th and 31st parallels of latitude, but it must not be supposed that even this comparatively small area—small compared to the size of the continent—is given over to hopeless desolation. Strips and stretches of available pastoral country, carrying both grass and edible bushes, are found throughout it, and should artesian water ever be struck there, these patches will become habitable. The worst of the desert lies amidst the sand dunes in the north: in the south the desert country is mostly harder ground covered with spinifex, but it has been crossed and recrossed by different parties many times during the present century. It is also reported that an available stock route has been discovered through it, to eastern settlement. A reference to the accompanying map contrasting the desert of the myths, with the desert of to-day, will show the steady decrease and disappearance of this imaginary interior desert. Even in 1882,



I.—The mythical Australian desert of 50 years ago.



II.—The vanishing desert of to-day.

Australia was described in an American cyclopædic work,\* as—"Perhaps the most absolute desert tract on the face of the globe is that which occupies the interior of the great island, or, as it may not improperly be termed, continent of Australia." And again—"The habitable portions of Australia are limited to the slopes of the mountains and the narrow space between them and the coast, in all not exceeding a width of 300 miles. The interior as far as is known, or as can be inferred from physical geography, is an immense depressed plain, more hopelessly barren and uninhabited than the great desert of Sahara."

The labour, enterprise and energy of the western gold-prospectors of the last ten years, have done much to remove this clinging stigma of the desert. In part explanation of this accepted "desert theory," it must be allowed that very often the country has been unfairly condemned by the discoverer, from the fact of it suffering at the time of his visit from the effects of a prolonged drought. Sturt's oft-quoted and misleading description of the heated surroundings of Strzelecki Creek and the bursting thermometer, has been responsible for much of this. This may have given rise to the idea, which may now be banished from men's minds for ever, that an uninterrupted and unbroken stretch of desert country usurps the interior of Australia. The strip of acknowledged desert country that still remains in evidence in the north-west, is, however, of a kind that later examination and explorations show to have but few redeeming features; but that it has some is undeniable. In the first place it is permanently inhabited by aborigines, who seemingly possess a knowledge of nature's secrets in the matter of enduring supplies of water. The migratory wild fowl of Australia do not hesitate to cross it, but most of the water is found in unexpected springs, the origin of which is unaccount-

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\* "The Polar and Tropical Worlds, a popular and scientific description of man and nature in the polar and equatorial regions of the globe. Embracing the combined results of all the explorations, researches, and discoveries of modern times. By H. G. Harting, edited by D. E. Guernsey, scientific editor of the American Cyclopædia."

able and obscure. Its greatest drawback lies in the parallel sand-ridges which cover the face of the country and render travelling impracticable.

In 1896, Mr. David Carnegie, who travelled through this country on a north-and-south course, crossed 86 sand-ridges in eight hours' travelling. But one redeeming feature which it has, in common with most of the desert country found in the interior, lies in the sudden transitions that happen from desert country to good available stock country—a change which often occurs with the abrupt suddenness of an emergence from a thick scrub.

**Oceans, Seas and Coasts.**—The west coast of Australia did not meet with much favour from the early navigators who made its acquaintance. Swept by rude gales from the Indian Ocean and presenting little shelter in the way of natural bays, inlets, or harbours, it was generally regarded as "inhospitable." It may, in justice to this opinion, be said that the west coast presents a naked front to the sea. Nor do the rivers redeem its character, for all of them have shallow mouths, blocked by bars. The hand of man and the skill of the modern engineer is, however, remedying these short-comings of nature.

The north coast of Australia washed by the Timor and Arafuran seas, has by no means such a bald outline as the other portions of the coast, the lesser indentations are numerous, and, besides the three or four smaller gulfs of Van Diemen, Cambridge and King's Sound, the great Gulf of Carpentaria bites deep into the land. It has two excellent natural harbours in Port Darwin and Port Essington, as well as numerous rivers with navigable entrances. It is within the steady influences of the S.E. trades, and for the long winter months it enjoys their equable sway. During the opposing reign of the N.W. monsoon, however, it suffers the wrath of the hurricanes and cyclones of that season.

The east coast, of itself, is not particularly diversified, and the southern portion shows the effect of rough handling from the Pacific; but from

just above the tropic line northward, it has the advantage of the protection of the Great Barrier Reef. This reef shelters the whole of the northern portion of the eastern coast, its termination north being in the Gulf of Papua. Its long protective influence is felt in the numerous sheltering nooks and ports of the tropical east coast. Of natural harbours, Port Denison and Port Curtis are most favourably known; while in the southern portion Port Jackson is of wide-world fame, and Twofold Bay and Broken Bay are good natural harbours.

On the southern coast, east and west are again in singular contrast. The eastern half is broken up by many inlets, of more or less importance, including Western Port, Port Phillip Bay, St. Vincent and Spencer Gulfs; then comes the long and curving sweep of the Great Australian Bight with a shore-line of sterile nakedness, where the Antarctic rollers shatter themselves on a bare line of cliffs sometimes 250 feet high, diversified with occasional beaches, of which the best known is Eyre's Sand Patch. At the western end, however, is the splendid harbour of King George's Sound.

In all, the coasts of Australia confront six seas: The Indian Ocean, the Timor Sea, the Arafura Sea—which receives the Australian rivers through the medium of the great Carpentarian Gulf—the Pacific, the Tasman Sea and the Southern Ocean.

Torres Strait and Bass Strait are two distinctive features of our continent. The first, between New Guinea and Cape York, is the northern entrance to the populous east coast, as Bass Strait is on the south. Their relative positions, climatic and physical surroundings, afford in themselves a presentment of this vast continent, Torres Strait having on the north the hot and steamy island of Papua, while to the southward is the headland of Cape York, of the true type of much Australian scenery. A low, blunt promontory fronts the Strait, whose grassy slope, scattered over with granite boulders and crowned with the same, runs down to meet a smooth white beach

of coral sand. The Strait itself is studded with islands, atolls and reefs, and the many-gated Barrier Reef closes its Pacific end. For long months it is a sea of summer isles, a smooth and rippling pass fanned by the steady south-east trades. Then again, lashed by the fierce winds from the north-west, it changes into a veritable pass of wreck and death, where the pearling craft are scattered and destroyed, and the cyclone-lashed waves play havoc in their wrath. This hidden strait saw no glint of sail till Torres returning from the New Hebrides ventured unknowingly to ruffle its waters with the "Almirante's" prow. In the same year a Dutch captain, one Willem Jansz in the "Duyfken," had sailed unwittingly across its western entrance a few months earlier.

The companion strait, the southern pass to the eastern coast, is, in its way, just as typical of Australia. Bold and bleak in appearance, a turbulent sea sets through it from the westward the long year round. No months of constant gentle winds ever play across its storm-tossed waters. These two straits appropriately guard the northern and southern extremities of the continent.





# DOANS DIRECTOR Of Australasia.



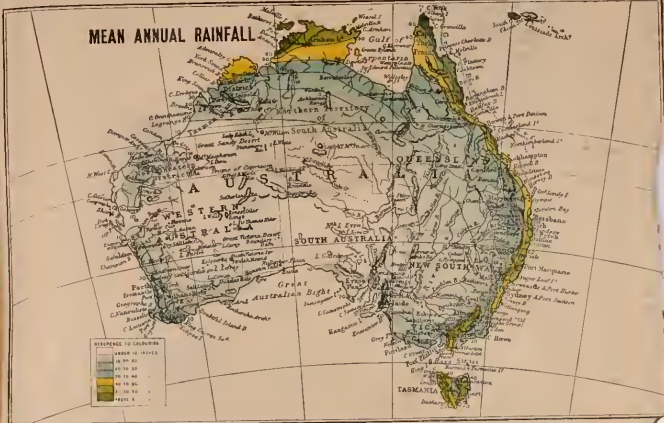
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*"Where is Sydney?"*



# MEAN ANNUAL RAINFALL



REFERENCE TO COLOURS

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80-60	60-40
40-20	20-10
10-5	Less than 5

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